PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04N 7/16

A1

(11) International Publication Number: WO 96/09723

(43) International Publication Date: 28 March 1996 (28.03.96)

(21) International Application Number: PCT/US95/11304

(22) International Filing Date: 6 September 1995 (06.09.95)

(30) Priority Data:
08/308,922 22 September 1994 (22.09.94) US

(71) Applicant: ASIAN TELEVISION & COMMUNICATIONS INTERNATIONAL, L.L.C. [US/US]; Suite 600, 5445 DTC Parkway, Englewood, CO 80111 (US).

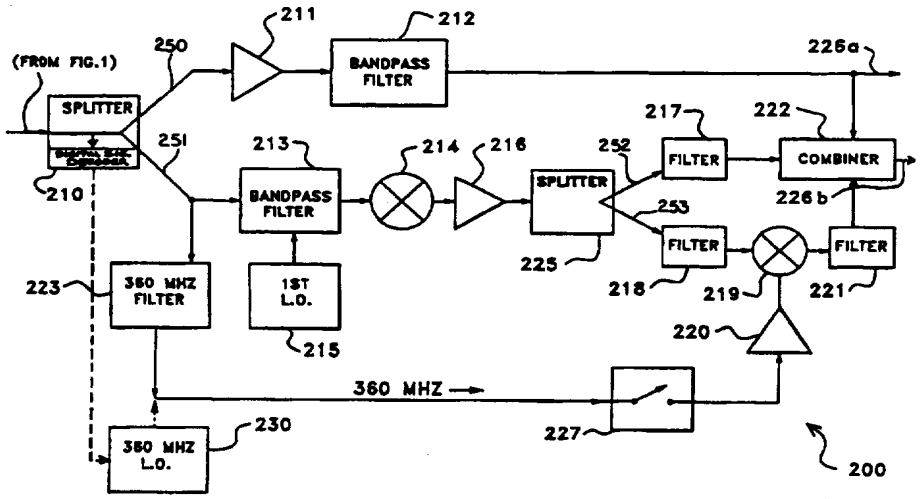
(72) Inventors: SIE, John, James; 17 Huntwick Lane, Englewood, CO 80110 (US). BASAWAPATNA, Ganesh, Ramaswamy; 6001 South Yosemite Street, Greenwood Village, CO 80111 (US). BASAWAPATNA, Varalakshmi; 6001 South Yosemite Street, Greenwood Village, CO 80111 (US).

(74) Agents: GUETLICH, Mark, A. et al.; Duft, Graziano & Forest, P.C., Suite 140, 1790-30th Street, Boulder, CO 80301-1018 (US).

(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: A SYSTEM FOR PROVIDING TIERED BANDWIDTH EXPANSION AND REMOTE AUTHORIZATION CAPABILITY FOR A CABLE TELEVISION SYSTEM



) Abstract

A system is described which provides a signal (310) which is sent for tier control purposes to the customer premises (350) along :h one or more other tiers of cable channels. This "Tier Control" signal is used to enable a given subscriber to receive a highband tier, l to assure that a particular cable operator cannot deny a specific one of the other tiers to any customer with an appropriate Channel ɔander Box (200) but can indeed deny a highband tier to any customer. The cable operator can deny access to the highband tier by use ı switch (227) in the Channel Expander Box (200). The system also provides tiering in a hierarchical fashion in such a way that one tier ne "platform" that is the composite of all available tiers is optional to the customer of the platform while one or more of the other tiers ıot available. Thus a programmer who owns space on a compulsory tier is assured that their programs will be carried by every customer ne platform regardless of whether another tier is carried or not.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**GB**	United Kingdom	**MR**	Mauritania
AU	Australia	**GE**	Georgia	**MW**	Malawi
BB	Barbados	**GN**	Guinea	**NE**	Niger
BE	Belgium	**GR**	Greece	**NL**	Netherlands
BF	Burkina Faso	**HU**	Hungary	**NO**	Norway
BG	Bulgaria	**IE**	Ireland	**NZ**	New Zealand
BJ	Benin	**IT**	Italy	**PL**	Poland
BR	Brazil	**JP**	Japan	**PT**	Portugal
BY	Belarus	**KE**	Kenya	**RO**	Romania
CA	Canada	**KG**	Kyrgystan	**RU**	Russian Federation
CF	Central African Republic	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CG	Congo			**SE**	Sweden
CH	Switzerland	**KR**	Republic of Korea	**SI**	Slovenia
CI	Côte d'Ivoire	**KZ**	Kazakhstan	**SK**	Slovakia
CM	Cameroon	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Chad
CS	Czechoslovakia	**LU**	Luxembourg	**TG**	Togo
CZ	Czech Republic	**LV**	Latvia	**TJ**	Tajikistan
DE	Germany	**MC**	Monaco	**TT**	Trinidad and Tobago
DK	Denmark	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**US**	United States of America
FI	Finland	**ML**	Mali	**UZ**	Uzbekistan
FR	France	**MN**	Mongolia	**VN**	Viet Nam
GA	Gabon				

A SYSTEM FOR PROVIDING TIERED BANDWIDTH EXPANSION AND REMOTE AUTHORIZATION CAPABILITY FOR A CABLE TELEVISION SYSTEM

FIELD OF THE INVENTION

The present system provides tiering and access security for cable television systems having bandwidths of approximately 450 MHz or less, and which do not employ addressable converters or decoders.

DESCRIPTION OF THE PROBLEM

Television channel assignments throughout the world are not contiguous over a given band or between bands. In the VHF band there are discontinuities between the low VHF and the high VHF bands. There is also a large discontinuity between VHF and UHF bands in addition to gaps within the UHF band. Until recent advances in reducing the cost of high frequency co-axial cable, cable losses and "moding" caused severe losses in any co-axial cable transmission beyond 450 MHz. In primitive cable systems such as in Peoples' Republic of China and India, the upper frequency limit that the cable can support is often as low as 300 or 350 MHz. Therefore, the only range that such co-axial systems could support were the 12 or 13 channels of the VHF band.

To partially solve the problem of limited available bandwidth cable systems have developed "cable TV" channel assignments. Basically, this scheme allows 350 MHz worth of transmission to take place using the existing cable system bandwidth, where, at the subscriber's television set, those channels in the mid-band are converter to the UHF band so that the subscriber gets to view perhaps up to 50 channels.

However, an additional problem that cable programmers and cable systems face is tiering and addressability. Cable programming quite often needs to be tiered to allow the operator to select combinations of programs that can be offered to the subscriber at a package price. To make the tiering effective there needs to be a method by which certain programs are available only to the intended subscribers. These functions are achieved by a combination of encoding, "trapping" and "authorization". Trapping is the process by which certain frequencies or bands are filtered out to prevent customers from receiving the associated programming. Sometimes video

signals are pre-distorted to render them unusable in a receiver without a trap designed to remove the distortion. "Authorization" refers to a digital or other means by which a particular customer's receiver is allowed to pass certain channel signals.

In some of the less technologically developed countries, these more advanced methods are too expensive on a per-subscriber basis to be implemented by the average cable system operator. In addition, the advent of video digital compression allows cable television systems to bypass the expensive intermediate step of channel expansion using addressable decoders to employ digital compression techniques instead. Thus, many third world cable television systems would prefer to opt for a less expensive means of increasing channel capacity beyond 12 channels until they implement a digital system.

SOLUTION

This invention addresses the intermediate step wherein addressable decoders are not employed, but wherein access control and security are nevertheless desired. The present system provides tiering and channel addressability at a cost that is a fraction of the cost of addressable converters. The system allows compressed signals to be transmitted to the head-end, and it also allows for system growth, in reasonable steps, to provide more than 36 channels.

The system provides a signal which is sent for tier control purposes to the customer premises along with the cable channels. This tier control signal enables a given subscriber to receive a specific tier, and assures that a particular cable operator cannot deny a "midband tier" to any customer with a Channel Expander Box (CEB). However, the cable operator can deny access to the highband tier by use of a switch in the Channel Expander Box.

The system also provides tiering in a hierarchical fashion in such a way that one tier of the "platform," which is the composite of all available tiers, is optional to the platform customer whereas one or more of the other tiers is not. Thus, a programmer who owns space on a compulsory tier is assured that their

programs will be carried by every platform customer regardless of whether another tier is carried or not.

Another important advantage of the present system is that no special hardware is required at the headend beyond an oscillator and an extra Integrated Receiver/Decoder (IRD). Therefore the system provides the least expensive means for implementing a tiered cable television system which provides two levels of access security.

BRIEF DESCRIPTION OF THE DRAWING

The invention may be better understood from a reading of the following description thereof taken in conjunction with the drawing in which:

FIG. 1 illustrates the cable television system environment in which the present system operates;

FIG. 2 illustrates a "Channel Expander Box" used with the present system; and

FIG. 3 shows an enhancement to the present system which provides "sub-tier" capability.

DESCRIPTION OF THE INVENTION

FIG. 1 is a block diagram that describes the operation of the system. At headend 104, there are a number of IRD's 105-*, each of which is tuned to a different video channel in a platform. Each IRD 105-* is preferably capable of decoding digitally compressed video signals. Since each channel is typically encoded, each in turn requires authorization by a particular cable operator to receive and distribute the particular channel. In addition, the uplink signal includes tier authorization information or an enabling signal which causes a "Tier Control Signal" oscillator 108 to be turned on. When a "special" tier referred to below as the "third tier" of television channels is authorized, up-link site 101 sends an authorization signal which is received by IRD 105-A at headend 104. The output from IRD 105-A initiates a relay closure or other similar enabling operation to cause 360 MHz oscillator 108 to be turned on. This 360 MHz

signal is used by a CEB to allow subscriber access to the "special" tier of television channels.

As shown in FIG. 1, a program that is originated by a cable/satellite programmer is played back and uplinked at a playback-uplink site 101, and beamed via antenna 102 to satellite 103. The satellite transponder frequency shifts and amplifies this signal and re-transmits the signal over the area of the footprint covered by the transmitting antenna of the satellite transponder.

At a typical headend 104, the signal from satellite 103 is received via a receiving antenna 110, downconverted to an L-band frequency, and transmitted to the appropriate IRD 105-* which receives the signal and decodes it to obtain the baseband video and audio signals that comprise the transmitted program as well as any control signals, data, or text that was sent from the playback uplink facility 101. The output of each IRD 105-* in a particular tier is modulated by modulator 106-* onto a carrier at an appropriate channel frequency for the particular tier.

The program transmitted and received can in general be in any form. It can be transmitted "in the clear", i.e., without any encryption so that it could be received by any suitably tuned receiver. Alternatively the program can be transmitted in analog fashion but scrambled using Videocipher-2, Videocrypt, or some other similar encryption device. Such an encrypted signal requires a properly equipped and authorized analog IRD to receive the signal and decode its audio and video components. Similarly, if the encoder is one that uses a digital compression and encryption format such as Digicipher-1, Digicipher-2, or MPEG-type algorithm, then the IRDs 105-* must be of the proper type to be able to decode the transmitted program.

In one exemplary embodiment of the present system, the first level of system security lies in an encrypted uplinked signal. This assures that only an authorized headend is capable of decrypting the signal and transmitting it to a customer.

The baseband signals that are output by each IRD 105-* are then modulated to a suitable Radio Frequency (RF) for transmission along with other similarly received or off-air received broadcast signals to the CATV subscribers

via cable or MMDS. Each modulator 106-* modulates the received video signal in Amplitude Modulation (AM) form around a video subcarrier, and the audio signal in Frequency Modulated (FM) form around an audio subcarrier that is suitable for the receiving country's television format, and upconverts the composite signal to the appropriate 6, 7 or 8 MHz RF band.

In the present system, the frequencies that are used to transmit the composite television signal can be, for example, in three distinct ranges:

1. The normal VHF TV frequency range, which includes channels 1 through 12 in the respective country's frequency allocation scheme. The CCITT frequency range for channels 1-12 is 47 to 68 MHz and 174 to 230 MHz.

2. The midband signal range, or "Gap Frequency". This frequency range is approximately 70 to 170 MHz.

3. The VHF - UHF Gap frequencies, extending typically from 230 to 350 MHz.

Channel Frequency Division

Any channel that is transmitted in the normal VHF range by the cable system can be received by a traditional TV set and is not a subject of this invention except insofar as that the signal is properly handled and delivered to the TV set by the system proposed herein.

The midband and VHF-UHF gap frequencies allow signal transmission over a frequency range not used for normal TV broadcasting. These gap frequencies allow signals to be transmitted within the 350 MHz bandwidth that most CATV cables in use in Asia can support without excessive losses or moding. Moding is a phenomenon in which the electromagnetic waves sent down the cable travel with their electrical and magnetic waves not perpendicular to the direction of travel, which causes increased transmission losses.

The modulator frequency selection is made by the cable headend operator. In the present system, the basic channels, i.e. the channels for which the operator charges the least amount of money to the subscriber, comprise the "first tier" of the platform. These first tier channels are contained within the VHF channel 1 through channel 12 range. These 12 channels can be operated

by the operator exactly as they are normally -- that is, without the CEB described below.

The "second tier" (midband tier) of the platform comprises the channels that are located in the VHF midband frequency range gap. The channel space available in this frequency gap is 92 MHz to 167 MHz in the Chinese system and 68 MHz to 174 MHz in the CCITT system. Since both the CCITT system and Chinese systems operate with 8MHz bandwidth in the UHF frequency range, the number of channels available in these systems in this tier is between 9 and 12.

The "third tier" (highband tier) in the present system covers the 230 to 350 MHz range gap. In this third tier there is 120 MHz of frequency available, allowing a further 12 to 15 channels of programming. Thus a system designed as in accordance with the present invention can have 32 channels of programming with no addition of special hardware other than Oscillator 108 at the headend 104.

The manner in which the CEB functions to separate the tiers and the system's tiering and security features are described below.

Each IRD 105-* receives a video signal and converts it into a form that a typical television system modulator 106-* can modulate. The channel numbering choice is made by the operator as explained previously. Combiner 107 then receives the modulator outputs from all of the different channels and combines them, after which they are transmitted via coaxial cable to the cable subscriber premises.

There is one "tier control" IRD 105-A in the present system. When the program controller at uplink site 101 sends a tier control enabling signal to headend 104, IRD 105-A in turn provides a signal that enables a "Tier Control Signal" oscillator 108 having a 360 MHz frequency. The output of this 360 MHz oscillator provides a 360 MHz Continuous Wave (CW) tone which is applied to combiner 107 and then sent for tier control purposes to the customer premises along with the cable channels. The output of combiner 107 is amplified to suitable level by amplifier 109 and sent via coaxial cable systems with the requisite amplifiers, splitters, equalizers and couplers to subscriber premises.

The exact frequencies of Tier Control Signal oscillator 108 and local oscillator described with respect to FIG. 2, below, can be changed according to the television frequency plan of the particular country.

Channel Expander Box

FIG. 2 illustrates CEB 200 in block diagram form. CEB 200 is a set top box located in the subscriber's premise that effects channel expansion and system security. At the input to CEB 200 is splitter 210 that splits the incoming RF signal from FIG. 1 into two equal signals along signal path 250 and signal path 251. Signal paths 250 and 251 carry the same frequencies. The VHF channels which are a part of the first low frequency tier on signal path 250, are amplified by amplifier 211. The output from amplifier 211 is filtered by bandpass filter 212 so that only the desired VHF frequency range is passed through to VHF output 226a to the subscriber's TV. However, where the subscriber's TV is not designed to accept two inputs from CEB 200, one output being from VHF output 226a and one output being from combined output 226b, VHF output 226a can be routed through combiner 222 to output 226b. Output 226b is capable of carrying the entire platform that in the present example includes three tiers.

The frequencies carried by signal path 251 are downconverted by way of the combination of bandpass filter 213, 600 MHz local oscillator 215, mixer 214, and amplifier 216. The components providing the downconversion can either be realized in discrete form or as an integrated circuit chip. Mixing the 600 MHz signal from local oscillator 215 with the VHF midband signal of 70 to 170 MHz, results in a 670 MHz to 770 MHz output comprising the second midband tier of television channels. Note that this frequency range does not conflict with any of the frequencies that are in use in the system so far, and therefore requires no special filtering except to mix spurious outputs and/or local oscillator feedthrough. The output from amplifier 216 is split into signal path 252 and signal path 253 by splitter 225. The frequency on signal path 252 is filtered by filter 217 to allow only the 670 to 770 MHz channels 46 to 57 in the CCITT system and channels 36 to 44 in the Chinese system, to pass through to the subscriber. Any subscriber having a CEB 200 that operates in the above

manner will be able to receive the midband channels if the cable operator provides channels in the midband frequency range. The frequency of local oscillator 215 and bandpass filter 217 can be modified to provide midband tier channels having other frequencies to match the channel assignments of other countries.

Signal path 253 delivers the 830-950 MHz output from splitter 225 to the 830 MHz high pass filter 218. Alternatively, filter 218 can be a 830-980 MHz bandpass filter. The output from filter 218 is mixed with a 360 MHz frequency obtained from 360 MHz filter 223. The 360 MHz filter 223 acts as a "second" local oscillator by extracting the 360 MHz frequency from the CW tier control signal from signal path 251. The 360 MHz frequency originated from oscillator 108 in headend 104. The 360 MHz signal is amplified by the amplifier 220 to a 10 dBm power level for mixer 219. Optionally, a 360 MHz local oscillator 230 can be directly installed in CEB 200. In such a case, filter 223 is not required, and optional digital signaling means 108' which replaces the 360 MHz local oscillator 108 located at headend 104, generates a digital control signal for controlling operation of the 360 MHz local oscillator 230. When digital signaling means 108' is employed, splitter 210 has additional and/or peripheral circuitry which functions as a digital signal decoder to enable local oscillator 230 when the digital signal generated by means 108' is detected.

The output of mixer 219 is 470 MHz to 590 MHz covering the UHF channels 21 to 35 in the CCITT system and channels 13 through 24 in the Chinese system. This output is filtered with filter 221, and combined in combiner 222 with the output of the filter 217, and then input to the UHF input of the subscriber's television tuner via output 226b.

Switch 227 which precedes amplifier 220 prevents mixer 219 from operating when the switch is open, thus providing the cable operator the control of access to the third highband tier to particular subscribers. The system therefore assures that a particular cable operator cannot deny the "midband tier" to any customer with a CEB but can indeed deny the highband tier to any customer. Switch 227 is located inside the CEB enclosure which is "sealed" by the cable operator after setting the switch to the desired position.

As explained above, the third highband tier has two levels of authorization and control. Table 1 elucidates this wherein it is shown that system control at uplink site 101 of the highband tier is provided by way of a 360 MHz authorization signal, and operator control of the highband tier is provided by switch 227 located in the CEB 200. Therefore, the provider of special services included in the highband tier at the uplink site is assured that a subscriber will receive all of these services if any at all are received.

Depending upon whether combiner 222 is a two way combiner or a three way combiner, there is flexibility to have two separate outputs 226a and 226b from CEB 200 for UHF and VHF channels individually, or to have a single output 226b carrying the entire platform of all three tiers. This allows connections to TV sets that have a single input to use the three way combiner option and those that have two inputs to use the two way combiner option.

FIG. 3 shows an enhancement to the system that includes using band rejection filters or "traps" 330 of different frequencies at the input to the CEB 200. Such traps or "Tiering" filters allow the cable operator to assure that none of the available tiers are pirated by an unauthorized "subscriber" using stolen or copied equipment. It also allows the cable operator to further break down each tier into sub-tiers if desired. For example, by placing the traps 330 outside the subscriber site 350 on a pole at tap 320, the traps 330 are easily inspected and/or maintained without entry into the subscriber's home.

In summary, the advantages of the present system include:

1. The system does not disturb the cable operator's present channel lineup.

2. The system provides for the tiering of channels so that groups of channels can be packaged and sold as tiers.

3. The system allows for different levels of security - at the headend, and at individual premises via traps.

4. It is realizable at low cost.

It is to be expressly understood that the claimed invention is not to be limited to the description of the preferred embodiment but encompasses other

modifications and alterations within the scope and spirit of the inventive concept.

Table 1

Authorization Levels for the CEB

Level	Hardware Used	System Control	Operator Control	Subscriber Access
1.	Midband+ Highband Traps	Headend Authorization	Trap	VHF Only
2.	CEB+ Highband Trap	Headend	Trap	VHF + Midband
3.	CEB+ 360 MHz	Authoriz. Signal	Highband Switch	All Channels

WE CLAIM:

1. A method for providing controlled access to a tier of television channels transmitted over a cable television system (300), said method comprising the steps of:

(a) providing an access control signal (101)for controlling access to a protected tier of said tier of said television channels;

(b) transmitting a television signal (310) which includes said access control signal over said cable television system (300);

(c) receiving said television signal (310) at a subscriber site (350); and

(d) providing subscriber access (200) to all television channels in said protected tier only when said access control signal (101) is detected in said television signal at said subscriber site (350).

2. The method of claim 1, wherein said step of providing subscriber access includes performing, at said subscriber site (350), the additional steps of:

(a) disabling a mixing circuit (219) to prevent said protected tier of said tier of television channels from being accessed by a subscriber;

(b) filtering said access control signal (223) from said television signal to provide an authorization signal;

(c) connecting a switch (227) between said authorization signal and said mixing circuit; and

(d) providing access by said subscriber to said television channels in said protected tier only when said switch (227) is set to a closed position to enable said mixing circuit (219) to operate.

3. The method of claim 1, wherein at least one secondary tier is provided, and wherein said secondary tier is protected from unauthorized access at said subscriber site (350) by the steps of:

(a) splitting (210) said television signal (310) into a first frequency band and a second frequency band;

(b) generating a local oscillator signal (215); and

(c) mixing (214) said local oscillator signal (108) with said second frequency band to provide to provide said secondary tier.

4. The method of claim 1, including the additional step of using at least one band rejection filter (330) located between a headend (104) of said cable television system (300) and said subscriber site (350) to provide control of access by a subscriber to any desired said tier of television channels.

5. The method of claim 1, including the additional step of using a band rejection filter (330) located between a headend (104) of said cable television system (300) and said subscriber site (350) to provide only a selected portion of said tier of television channels to a subscriber.

6. An apparatus for providing controlled subscriber access to a tier of television channels transmitted in a television signal over a cable television system (300), wherein said television signal includes an access control signal, said apparatus comprising:

(a) means (210) for splitting a desired frequency band from said television signal (310);

(b) means (223) for filtering out said access control signal from said desired frequency band;

(c) means (219) for mixing said access control signal with said desired frequency band to generate said tier of television channels; and

(d) switch means (227) for enabling and disabling said mixing (219) to respectively allow and prevent access to said tier by said subscriber.

7. An apparatus for providing controlled subscriber access to a tier of television channels transmitted in a television signal over a cable television system (300), said apparatus comprising:

(a) means (210) for splitting a desired frequency band from said television signal;

(b) oscillator means (230) for generating an access control signal;

(c) means (219) for mixing said access control signal with said desired frequency band to generate said tier of television channels; and

(d) switch means (227) for enabling and disabling said mixing to respectively allow and prevent access to said tier by said subscriber.

8. The method of claim 7, wherein said television signal includes a digital control signal (108') and said apparatus further includes means for detecting (210) said digital control signal (108') and enabling said oscillator means (230).

9. A system for providing controlled access to a tier of television channels transmitted over a cable television system, said system comprising:

(a) means (101) for providing an access control signal for controlling access to a protected said tier of said television channels;

(b) means (104) for transmitting a television signal which includes said access control signal over said cable television system;

(c) means (200) for receiving said television signal at a subscriber site (350); and

(d) means (200) for providing subscriber access to all of said television channels in said protected tier only when said access control signal is detected in said television signal at said subscriber site.

10. The system of claim 9, wherein said means for providing subscriber access further includes:

(a) a mixing circuit (219) which, when operative, allows said protected tier of channels to be accessed by said subscriber;

(b) means (223) for filtering said access control signal from said television signal to provide an authorization signal; and

(c) a switch (227) connected between said authorization signal and said mixing circuit (219), said switch (227) causing operation of said mixing circuit (219) when set to a closed position;

wherein access by said subscriber to said television channels in said protected tier is provided only when said switch (227) is set to said closed position causing said mixing circuit to operate.

11. The system of claim 9, wherein at least one secondary tier is provided, and wherein said secondary tier is protected from unauthorized access at said subscriber site by:

(a) means (210) for splitting said television signal into a first frequency band and a second frequency band;

(b) means (215) for generating a local oscillator signal; and

(c) means (214) for mixing said local oscillator signal with said second frequency band to provide to provide said secondary tier.

12. The system of claim 9, further including:

at least one band rejection filter (330) located between a headend (104) of said cable television system (300) and said subscriber site (350) to provide control of access by said subscriber to any desired said tier of television channels.

13. The system of claim 9, further including:

a band rejection filter (330) located between a headend (104) of said cable television system (300) and said subscriber site (350) to provide only a selected portion of a selected said tier of television channels to said subscriber.

14. A method for providing controlled subscriber access to a tier of television channels transmitted in a television signal over a cable television system (300), wherein said television signal includes an access control signal, said method comprising the steps of:

(a) splitting (210) a desired frequency band from said television signal;

(b) filtering (223) out said access control signal from said desired frequency band;

(c) mixing (219) said access control signal with said desired frequency band to generate said tier of television channels; and

(d) using a switch (227) to enable and disable said mixing to respectively allow and prevent access to said tier by said subscriber.

15. The method of claim 14, including the additional step of using at least one band rejection filter (330) located between a headend (104) of said cable television system (300) and a subscriber site (350) to provide control of access by said subscriber to any desired said tier of television channels.

16. The method of claim 14, including the additional step of using a band rejection filter (330) located between a headend (104) of said cable television system (300) and a subscriber site (350) to provide only a selected portion of a selected said tier of television channels to said subscriber.

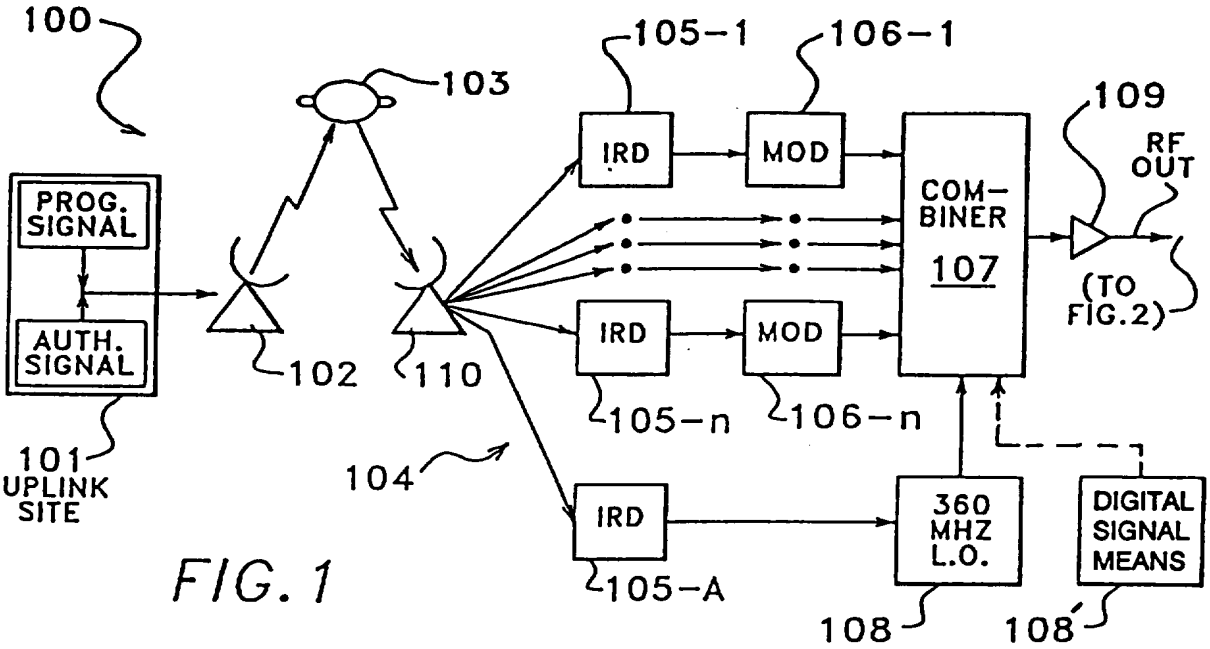

100
PROG. SIGNAL
AUTH. SIGNAL
101
UPLINK SITE
102
103
104
110
105-1
106-1
IRD
MOD
105-n
106-n
IRD
MOD
IRD
105-A
COM-BINER
107
109
RF OUT
(TO FIG.2)
360 MHZ L.O.
108
DIGITAL SIGNAL MEANS
108'

FIG. 1

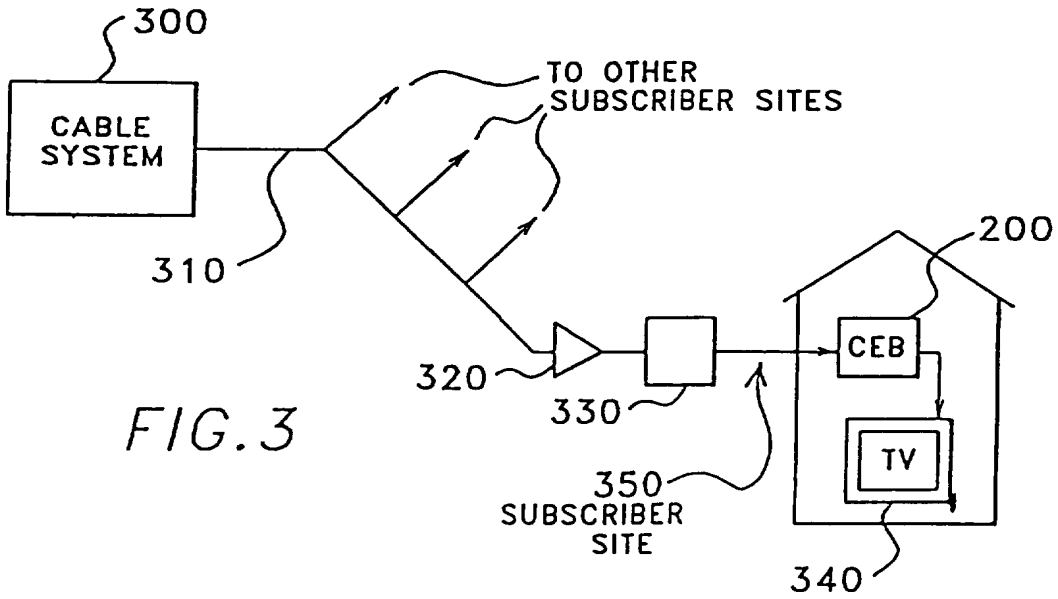

300
CABLE SYSTEM
TO OTHER SUBSCRIBER SITES
310
320
330
200
CEB
TV
350
SUBSCRIBER SITE
340

FIG. 3

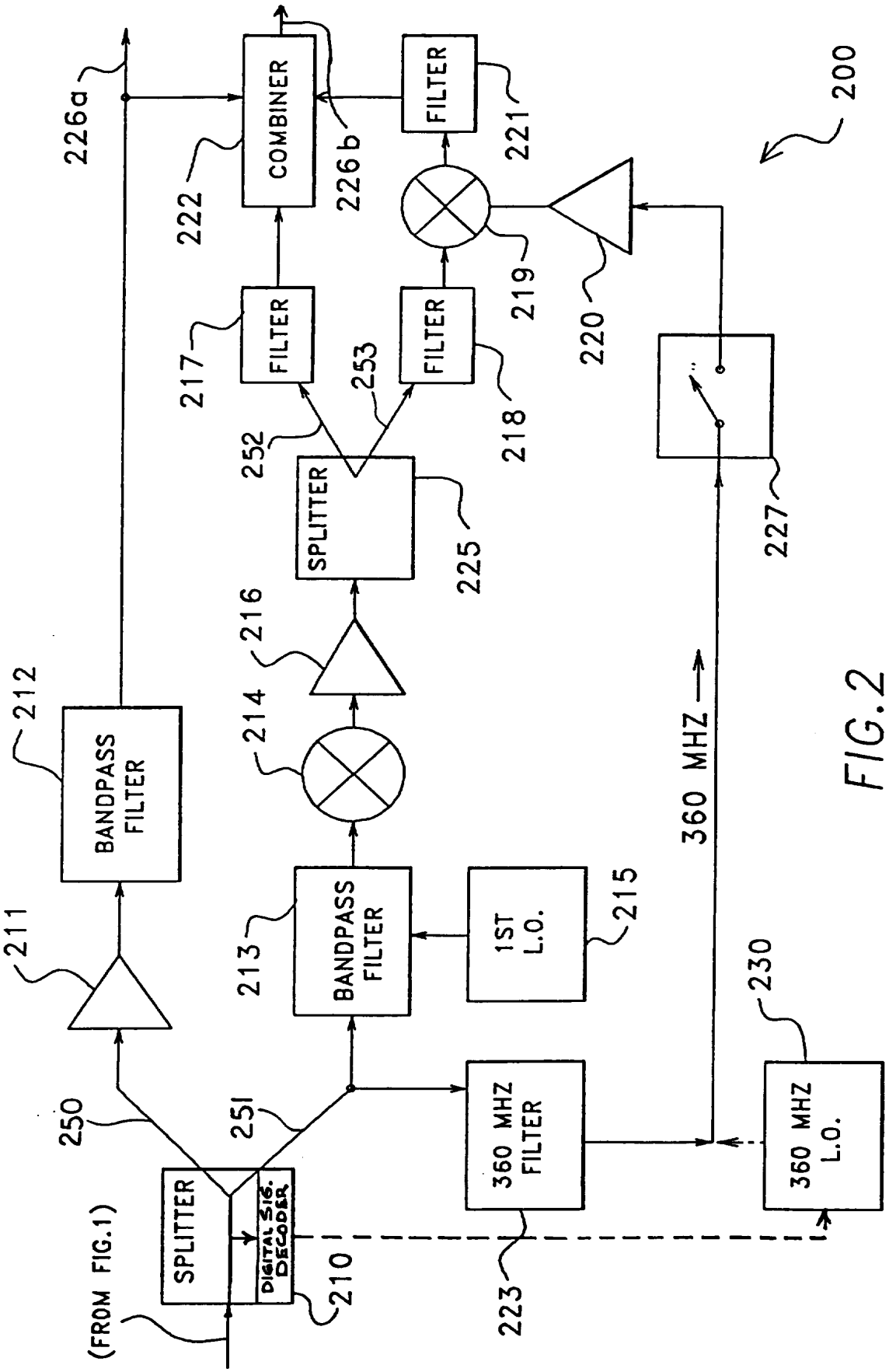

(FROM FIG.1)
SPLITTER
DIGITAL SIG. DECODER
210
250
251
211
BANDPASS FILTER
212
213
BANDPASS FILTER
214
216
SPLITTER
225
252
253
217
FILTER
218
FILTER
222
COMBINER
226a
226b
221
FILTER
219
220
227
1ST L.O.
215
360 MHZ FILTER
223
360 MHZ L.O.
230
360 MHZ
200

FIG. 2

INTERNATIONAL SEARCH REPORT

National Application No
PCT/US 95/11304

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	WO,A,94 16527 (INFORMATION RESOURCES INC) 21 July 1994 see page 7, line 19 - page 18, line 26 see figures 1-8 ---	1,3,4,9, 11-13 7,8, 14-16 2,5,6,10
X Y	GB,A,2 089 623 (SONY CORP) 23 June 1982 see page 1, right column, line 71 - line 112 see page 2, left column, line 57 - page 4, left column, line 40 see figures 1-5 --- -/--	1-3,6 7,8, 14-16

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 December 1995	24. 01. 96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016	Van der Zaal, R

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

I. ational Application No
PCT/US 95/11304

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,3 882 266 (WALDING EUGENE C) 6 May 1975 see the whole document -----	1-16

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Ir ational Application No
PCT/US 95/11304

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO-A-9416527	21-07-94	US-A-	5389964	14-02-95
		AU-B-	5962394	15-08-94
		CA-A-	2152585	21-07-94
		EP-A-	0679317	02-11-95
GB-A-2089623	23-06-82	JP-C-	1717312	14-12-92
		JP-B-	3081354	27-12-91
		JP-A-	57091085	07-06-82
		CA-A-	1196084	29-10-85
		US-A-	4518993	21-05-85
US-A-3882266	06-05-75	BE-A-	807507	15-03-74
		CA-A-	986616	30-03-76
		CH-A-	556124	15-11-74
		DE-A-	2401314	18-07-74
		FR-A,B	2214221	09-08-74
		GB-A-	1397856	18-06-75
		JP-A-	49105413	05-10-74
		NL-A-	7317262	15-07-74